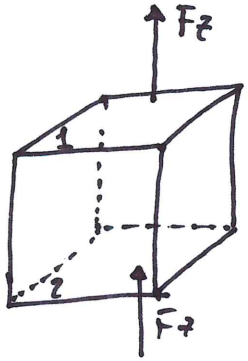
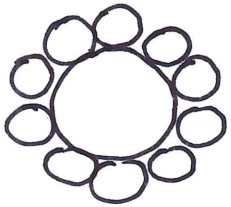
- Omogeneo
- Ortotropo
- Isotropo
- Anisotropo

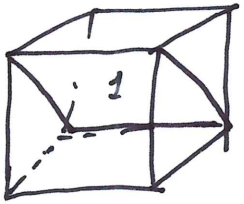


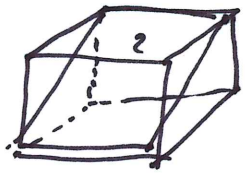
3 componenti normali
6 componenti di taglio

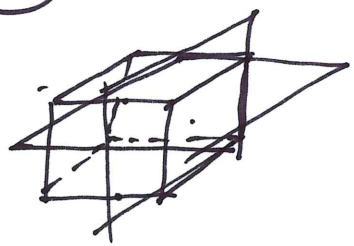
9 × 6 lati del cubo = 54 componenti



144 componenti

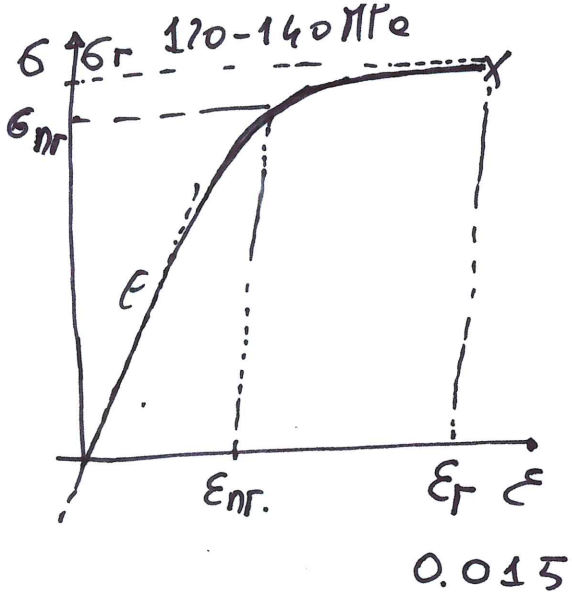




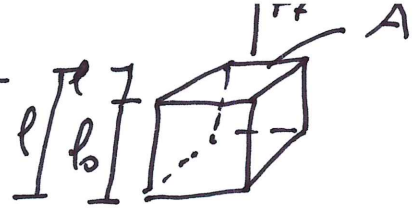


3

54 × 3 = 162 componenti − 18 componenti = 144 componenti



$$\sigma = \frac{F}{A}$$

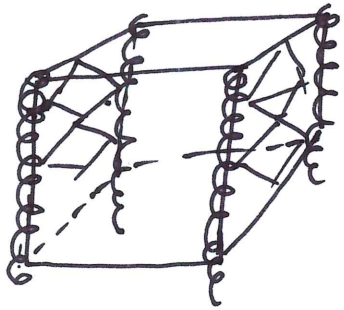


$$\varepsilon = \frac{l - l_0}{l_0}$$

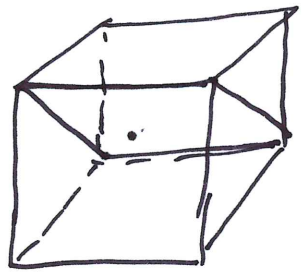
$$\sigma = E\,\varepsilon$$

$$\sigma_{ij} = E_{ijkl}\,\varepsilon_{kl}$$

Stazionarietà

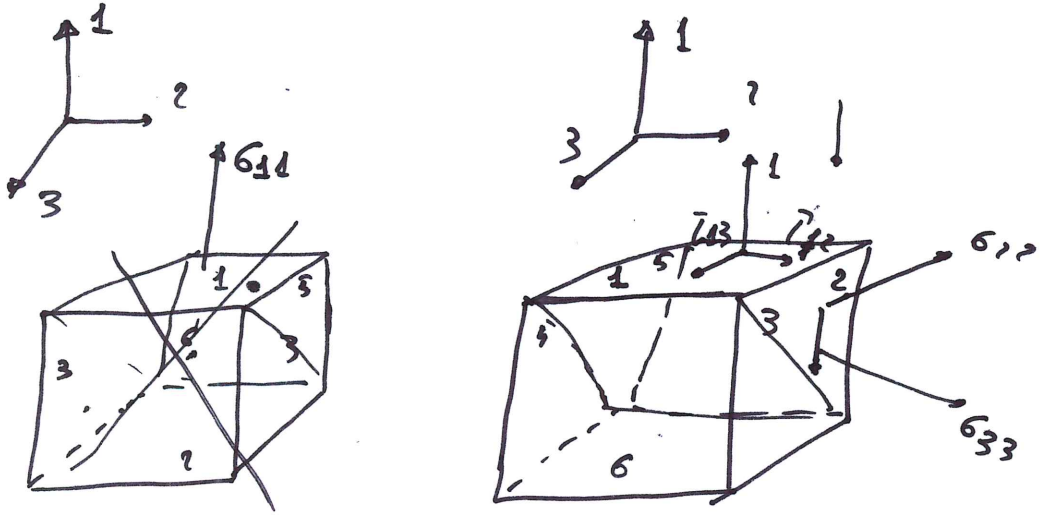


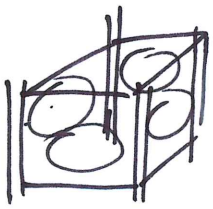
$t = t^*$



$$\underline{\sigma_i} = E_{ij}\,\underline{\varepsilon_j}$$

$$\begin{bmatrix} \sigma_{11} \\ \sigma_{22} \\ \sigma_{33} \\ \tau_{12} \\ \tau_{13} \\ \tau_{21} \\ \tau_{23} \\ \tau_{31} \\ \tau_{32} \end{bmatrix} = \begin{bmatrix} Q_{11} & \cdots & Q_{19} \\ & \ddots & \\ Q_{91} & \cdots & Q_{99} \end{bmatrix} \begin{bmatrix} \varepsilon_{11} \\ \varepsilon_{22} \\ \varepsilon_{33} \\ \varepsilon_{12} \\ \varepsilon_{13} \\ \varepsilon_{21} \\ \varepsilon_{23} \\ \varepsilon_{31} \\ \varepsilon_{32} \end{bmatrix}$$





$$\begin{bmatrix} O_{11} & \cdots & O_{19} \\ \phi & & O_{21} \end{bmatrix}$$

$$\begin{bmatrix} A & B \\ D & C \end{bmatrix} \quad D = \phi$$

$$\begin{bmatrix} I_{DR} & I_{DR} \cdot C_{oll} \\ C_{oll} - I_{DR} & C_{oll} \end{bmatrix} \quad C_{oll} - I_{DR} = \phi$$

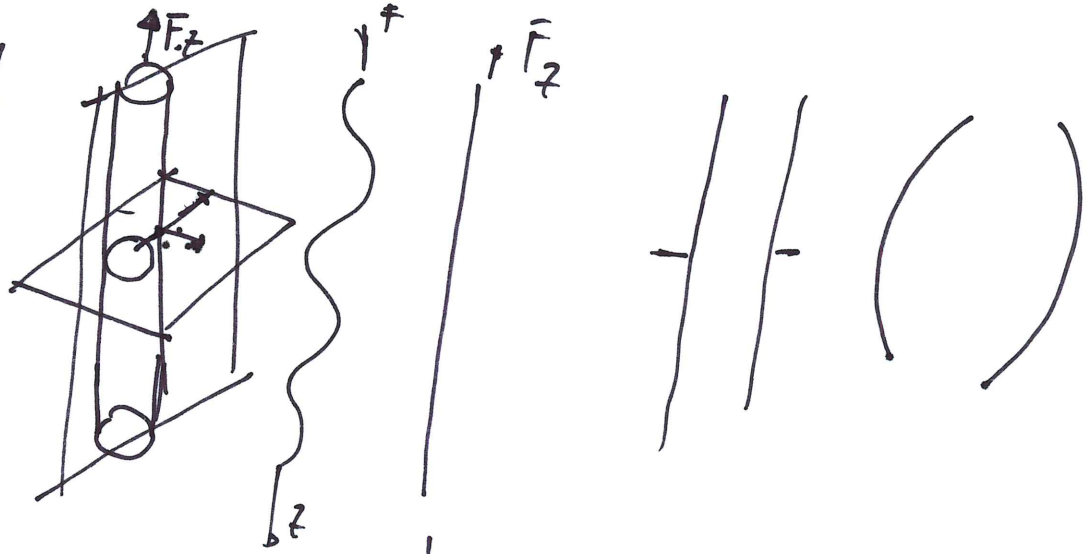
$$\begin{bmatrix} I_{DR} & \phi \\ \phi & C_{oll} \end{bmatrix} \quad \rightarrow 6$$

$$\begin{bmatrix} I_{DR11} & \cdots & I_{DR16} \\ \phi & & I_{DR66} \end{bmatrix} \quad \rightarrow 21$$

$$\begin{bmatrix} \phi & \\ \phi & C_{dll11} C_{oll22} C_{dll33} \\ & C_{dll12} C_{dll13} \\ \phi & C_{dll23} \end{bmatrix} \quad \rightarrow 6$$

27 components.

$$\begin{bmatrix} C_{coll_{11}} & C_{coll_{12}} & C_{013} \\ \phi & C_{coll_{22}} & C_{023} \\ \phi & \phi & C_{coll_{33}} \end{bmatrix}$$

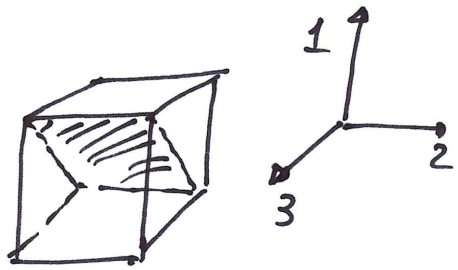


$$\begin{bmatrix} C_z & \phi \\ \phi & C_{rad} \\ \phi & C_{TANT} = \frac{C_z + C_{rad}}{2} \end{bmatrix}$$

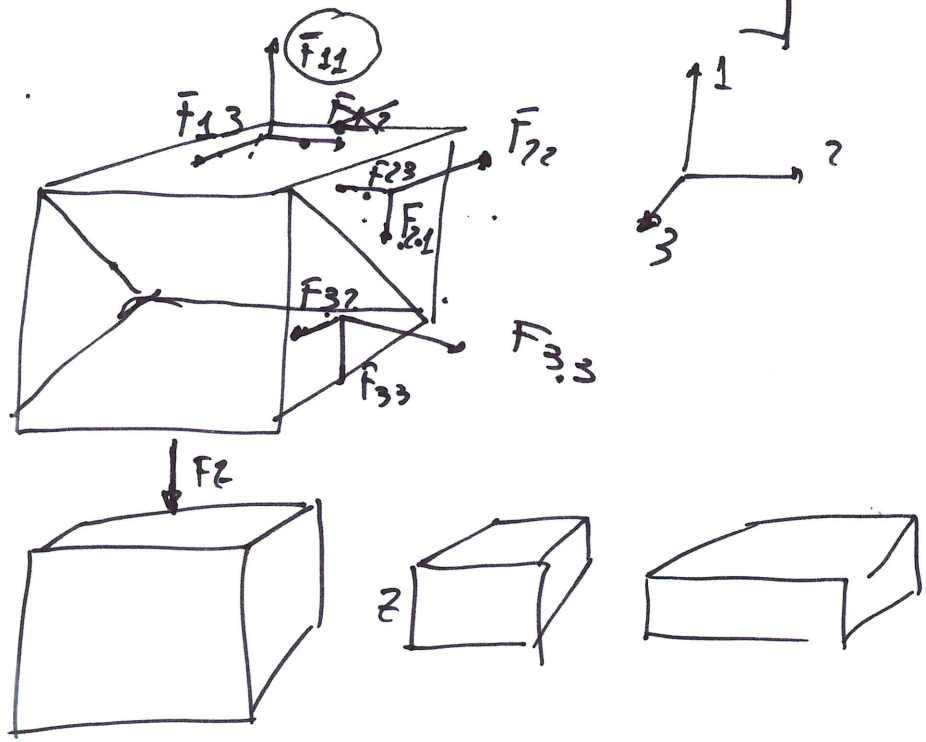
6 componenti.

2 componenti.

$$\begin{bmatrix} a_{11} & \cdots & a_{16} \\ \phi & & \\ & & a_{66} \end{bmatrix}$$



$$\begin{bmatrix} Q_{11} & Q_{12} & Q_{13} & Q_{14} & Q_{15} & Q_{16} \\ & Q_{22} & Q_{23} & Q_{24} & Q_{25} & Q_{26} \\ & & Q_{33} & Q_{34} & Q_{35} & Q_{36} \\ & & & Q_{44} & Q_{45} & Q_{46} \\ & & & & Q_{55} & Q_{56} \\ & & & & & Q_{66} \end{bmatrix} \begin{bmatrix} \sigma_1 \\ \sigma_2 \\ \sigma_3 \\ \sigma_{12} \\ \sigma_{13} \\ \sigma_{23} \end{bmatrix}$$



$$\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ \phi & a_{22} & a_{23} \\ \phi & \phi & a_{33} \end{bmatrix} \begin{bmatrix} \cdot & \cdot \\ 6 & \phi \\ \cdot & \cdot \end{bmatrix}$$

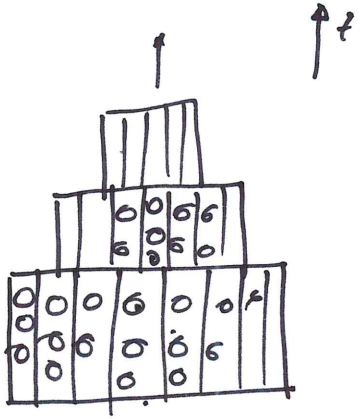
$$\begin{bmatrix} \cdot & \cdot \\ \phi & \cdot \\ \cdot & \cdot \end{bmatrix} \begin{bmatrix} Col_1 & \phi \\ & Col_2 \\ \phi & Col_3 - Col_2 + Col_1 \end{bmatrix} \rightarrow 2$$

8 componenti principali

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ & a_{22} & a_{23} \\ \phi & & a_{33} \end{bmatrix} \begin{bmatrix} \cdot & \cdot \\ \phi & \cdot \\ \cdot & \cdot \end{bmatrix}$$

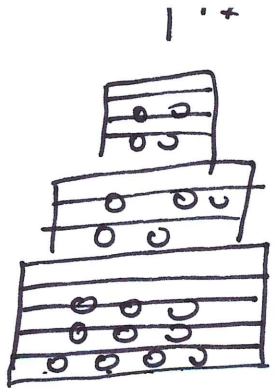
$$\begin{bmatrix} \cdot & \cdot \\ \phi & \cdot \\ \cdot & \cdot \end{bmatrix} \begin{bmatrix} c_1 & 0 & 0 \\ 0 & c_2 & 0 \\ 0 & 0 & \frac{c_1 c_2}{2} \end{bmatrix}$$

7 componenti



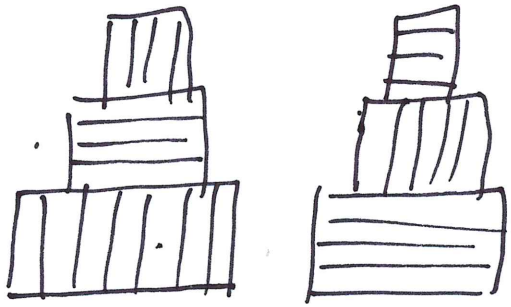
Tipo L

Longitudinale



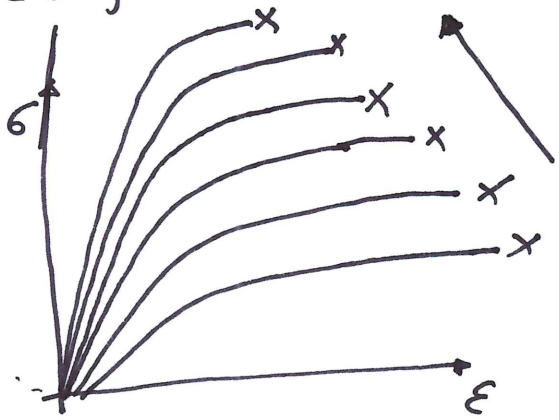
Tipo T

Trasversale

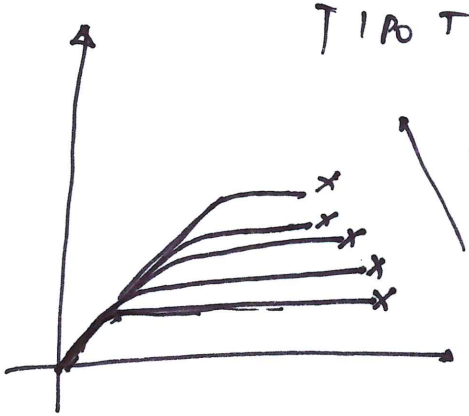


Tipo M

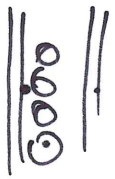
MISTO

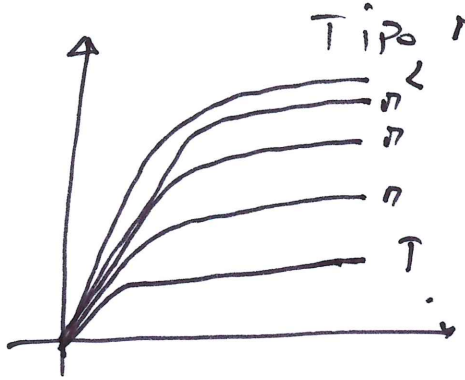


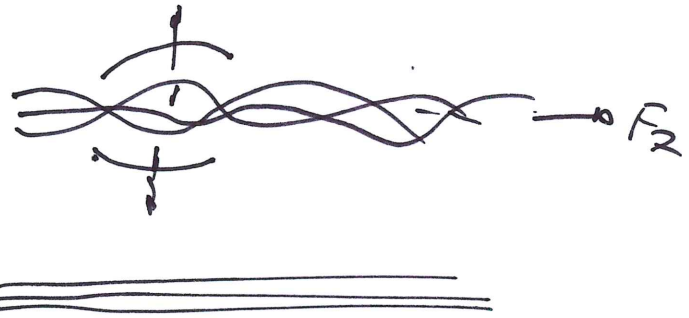
$$\dot{\varepsilon} = \frac{d\varepsilon}{dt}$$



$$\dot{\varepsilon} = \frac{d\varepsilon}{dt}$$







1,8? m

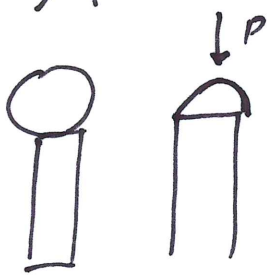
78 Kg.

$\varepsilon = 8000$

$\sigma = \varepsilon E$

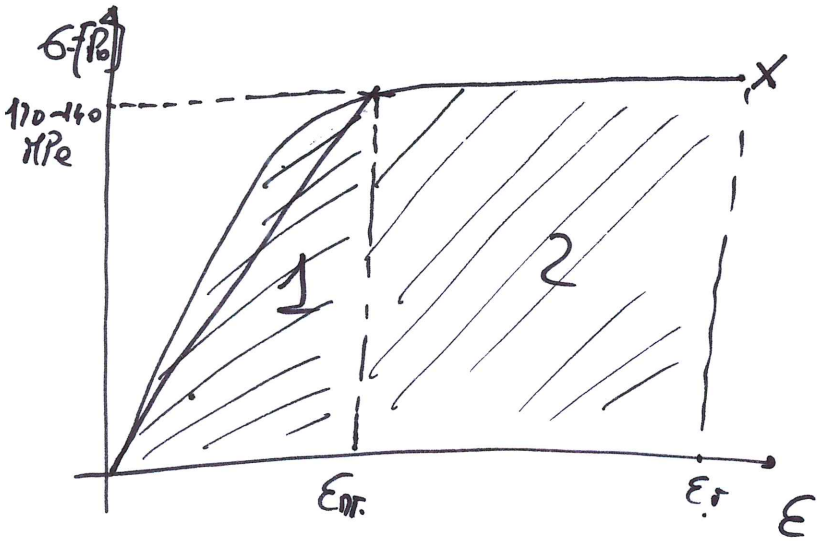
$E = \frac{\sigma}{\varepsilon} =$

$\sigma = \frac{F}{A} = \frac{m \cdot g}{2\pi 2^? f} = \frac{78 \cdot 10}{6,28 \cdot 4 \cdot 10^{-4}} = \frac{780\ N}{25 \cdot 10^{-4} m^?} = 31,2 \cdot 10^4 \cdot Pa$



$2R = 2 \cdot cm$

$E = \frac{31,2 \cdot 10^4}{8000}\ Po = \frac{312}{8} = 39\ Po.$



$\varepsilon_r = 0.015$

$\varepsilon_{nr} = 0.001$

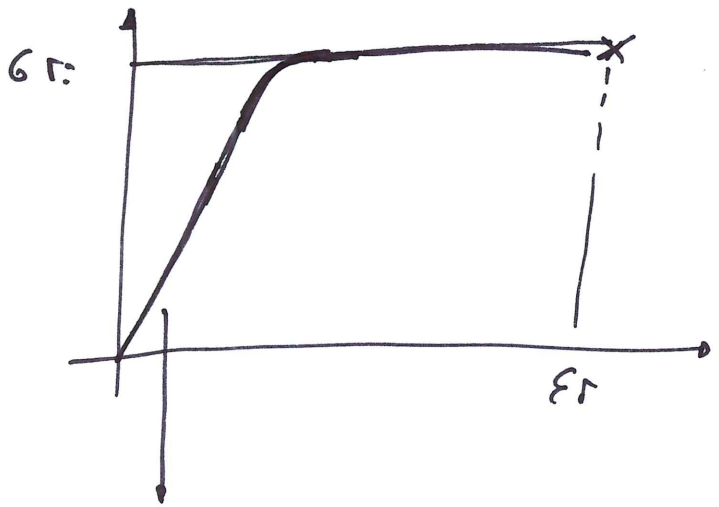
$E = E_1 + E_2$

$\sigma_r = 170 - 140\ MPa$

$$E_1 = \frac{1}{2}(\varepsilon_{nr} \cdot \sigma_r) \cdot V_{oss}$$

$$E_2 = \sigma_r \cdot [\varepsilon_r - \varepsilon_{nr}] \cdot V_{oss}$$

$$E = V_{oss} \cdot \left[\sigma_r \left[\frac{1}{2}\varepsilon_{nr} + [\varepsilon_r - \varepsilon_{nr}]\right]\right]$$



$\sigma = E\varepsilon$

RAMBERG-OSGOOD

$$\varepsilon = \frac{\sigma}{E} + \underset{\phi}{\alpha}\,\sigma^{n}\cdot\varepsilon^{b}$$

$$\varepsilon = \frac{\sigma}{\dot{\varepsilon}^{a}\cdot C}$$

$$\varepsilon = \frac{\sigma}{\dot{\varepsilon}^{p} \cdot c} + a \, \sigma^{n} \cdot \dot{\varepsilon}^{b}$$

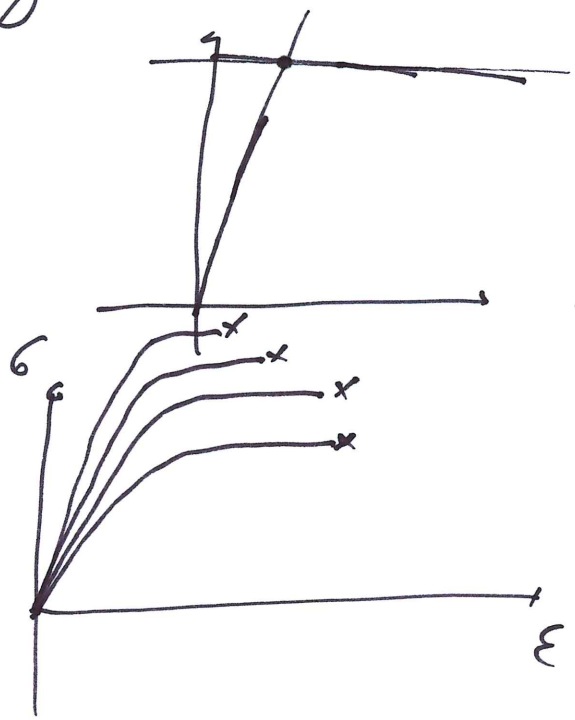
$$= \phi$$

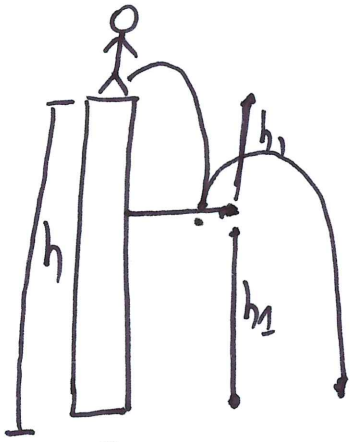
$$\varepsilon = \frac{\sigma}{\dot{\varepsilon}^{p} \cdot c}$$

$$\sigma = \varepsilon \, E$$

$$\sigma = \dot{\varepsilon}^{p} \cdot c \cdot \varepsilon$$

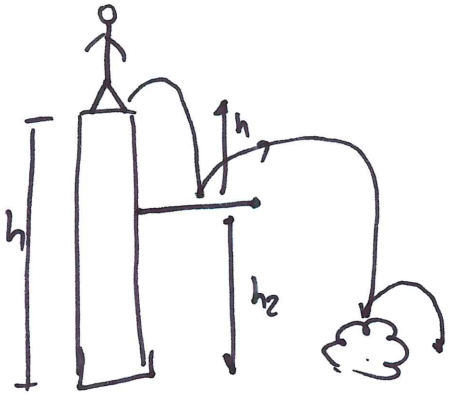
$$E = c \cdot \dot{\varepsilon}^{p}$$





h ?

h 1



E_{cons} 50% Energia di Impatto